

## **REMARKS**

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claims 1-17 are pending in this application. Non-elected claims 10-14 are withdrawn from consideration.

Claims 1 and 3 have been amended to recite “wherein the multilayer wall structure has been once cooled, re-heated and then co-stretched to satisfy formula (2)”. Support for these amendments can be found on page 3, line 20 – page 4, line 2 of the specification.

Claims 1-9 and 15-17 have been amended to make minor editorial changes, which are self-explanatory.

### **I. Objection to the Abstract**

The Examiner objects to the Abstract for not containing proper language, and for not containing 50-150 words. Applicants submit herewith a Substitute Abstract containing proper language and having 128 words. Accordingly, reconsideration and withdrawal of the objection are respectfully requested.

### **II. Claim Objection**

The Examiner objects to claims 5 and 6, because of minor informalities. Claim 5 has been amended to recite “wherein”, as suggested by the Examiner. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

### **III. Claim Rejection Under 35 U.S.C. § 103**

The Examiner rejects claims 1-9 and 15-17 under 35 U.S.C. § 103(a) as being unpatentable over Nakajima et al. (JP 2003-136657). As applied to the amended claims, Applicants respectfully traverse the rejection.

The Examiner appears to have used a machine translation of the Nakajima et al. reference obtained from the Japan Patent Office (JPO) web site in the rejection. Applicants note that JP 2003-136657 corresponds with US Patent Application Publication No. 2005/0011892, cited on the Information Disclosure Statement filed September 12, 2008, and presume that the US

publication has a substantially identical (or even expanded) disclosure as compared to the JP document. **Accordingly, Applicants refer to US 2005/0011892 when citing to the reference in the following remarks.**

**The Examiner admits that the reference does not disclose formula (2)**, but asserts that it would have been obvious to adjust the volume of the container (“v”) and the weight content of the PGA (“w”) through routine experimentation (see page 3, lines 15-23 of the Office Action).

According to MPEP 2144.05 II.B., a particular parameter must **first be recognized as a result-effective variable**, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. The Examiner has not provided any reason to explain why the volume of the container (“v”) and the weight content of the PGA (“w”) of formula (2) would be recognized as result-effective variables.

#### The Present Invention

Claims 1 and 3 recite “**the multilayer wall structure has been cooled once, re-heated and then co-stretched to satisfy formula (2)**”. The present invention is based on the discovery that in a process for producing a multilayer hollow container by blow molding through a **cold-parison scheme** (i.e., a process of forming a hollow laminate preform comprising a polyglycolic acid resin (PGA) and a polyester resin (other than PGA) as represented by an aromatic polyester resin (PET), **cooling once, re-heating and then co-stretching the perform**) it is possible to obtain a hollow container having unexpectedly superior gas-barrier properties through optimization of the re-heating and co-stretching conditions, particularly for preventing premature crystallization before the stretching.

By optimizing the combination of a PGA resin and a co-laminated resin of an aromatic polyester resin or an aliphatic polyester resin and re-heating to prevent premature crystallization before the stretching of the laminate preform, Applicants have succeeded in minimizing the left-side term “ $T \times w/v$ ” in formula (2) of claims 1 and 3, thus maximizing the gas-barrier properties of the PGA resin layer and arriving at the presently claimed invention. See page 4, lines 6-24 of the present specification.

Thus, claims 1 and 3 recite “wherein the multilayer wall structure has been cooled once, re-heated and then co-stretched to satisfy formula (2), ( $T \times w/v \leq 0.8 \times 10^{-3}$ ) (2), wherein T represents an oxygen gas permeability (ml/container/day/atm), v represents a volume (ml) of the container, and w represents a content (wt.%) of the polyglycolic acid resin with respect to a whole weight of the container”.

Comparison with Nakajima et al.

The Nakajima et al. reference refers to the applicability of stretch blow molding according to a hot-parison method and a cold-parison method (see paragraph [0102] of US 2005/0011892). However, examples 1-3 of the reference were performed through stretch blow molding according to the **hot-parison method**, and the reference does not disclose any example using a cold-parison method. Furthermore, the reference does not disclose or suggest any reason why the volume of the container (“v”) and the weight content of the PGA (“w”) of formula (2) would be recognized as result-effective variables.

Thus, Applicants take the position that the reference does not disclose or suggest that a cold-parison method for stretch blow molding provides a hollow container having improved gas-barrier properties.

It would not have been obvious to obtain a hollow container having excellent gas-barrier properties comparable to those of the hollow container of claims 1 and 3 by using stretch blow molding through the hot-parison scheme for several reasons. First, it is difficult to obtain a high degree of stretch orientation of a PGA layer to lead to improved gas-barrier properties. Second, the PGA layer in a laminate preform (i.e., a parison) obtained according to the hot-parison scheme is liable to be either crystallized or in an amorphous state having too high of a fluidity by which stretch orientation effect cannot occur. As a result, it is impossible to obtain a stable amorphous state capable of causing a proper stretch orientation effect at a low temperature, which would lead to improved gas-barrier properties.

Third, if a hot-parison scheme having a resin temperature of 160°C, as described in paragraph [0137] of Nakajima et al., is adopted, then premature crystallization is likely to occur. This is similar to Comparative Example 1 of the present specification, which uses a re-heating temperature of 93°C according to the cold-parison scheme, which failed to provide improved

gas-barrier properties. However, if a hot-parison at 1600°C is subjected to quick blow molding, then sufficient stretch orientation effects cannot be attained, because the PGA molecules in the amorphous state have excessive fluidity. Therefore, it would not have been obvious to obtain a hollow container having excellent gas-barrier properties comparable to those of the hollow container of claims 1 and 3 by using stretch blow molding through the hot-parison scheme.

In the blow molding process according to the cold-parison scheme of claims 1 and 3, while maintaining the amorphous state exhibiting an inherently high initial density contributing to high gas-barrier properties of PGA, stretching is performed at a relatively low temperature for preventing premature crystallization. As a result, it is possible to obtain improved gas-barrier properties based on an effective molecular orientation effect.

The improved gas-barrier properties based on the effective molecular orientation effect in the PGA layer is represented by the formula (2):  $T \times w/v \leq 0.8 \times 10^{-3}$ , wherein T represents an oxygen gas permeability (ml/container/day/atm), v represents a volume (ml) of the container, and w represents a content (wt.%) of the polyglycolic acid resin with respect to a whole weight of the container. “ $T \times w$ ” in formula (2) represents an oxygen permeation rate per PGA content, and a smaller value of “ $T \times w$ ” means more effective gas-barrier properties are exhibited by the PGA. The coefficient “/v” represents better gas barrier properties, **even at a small volume**, in resistance to a tendency that the contribution of gas permeation wall area (proportional to a square of length) is increased at a smaller container volume proportional to a cube of length). Thus, the requirement of formula (2) represents superior gas barrier properties per unit PGA content even at a small container volume, which is not disclosed or suggested by the reference.

Accordingly, the reference’s teaching of stretch blow molding according to the hot-parison scheme would not have suggested the superior gas barrier properties obtained in the presently claimed invention and represented by formula (2). Further, the reference provides no reason why the volume of the container and the weight content of the PGA of formula (2) of claims 1 and 3 would have been result-effective variables.

Therefore, claims 1 and 3 would not have been obvious over the reference.

Claims 2, 4-9 and 15-17 depend directly or indirectly from claims 1 and 3, and thus also would not have been obvious over the reference.

Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

**IV. Conclusion**

For these reasons, Applicants take the position that the presently claimed invention is clearly patentable over the applied reference.

Therefore, in view of the foregoing amendments and remarks, it is submitted that the objections and rejection set forth by the Examiner have been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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